



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/532,786   | 03/22/2000  | Nobuhiko Hayashi     | 000351              | 8588             |
| 23850  | 7590        | 03/08/2005           | EXAMINER            |                  |
| ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP<br>1725 K STREET, NW<br>SUITE 1000<br>WASHINGTON, DC 20006 |             |                      | RODRIGUEZ, ARMANDO  |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2828                |                  |

DATE MAILED: 03/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/532,786

Applicant(s)

HAYASHI ET AL.

Examiner

ARMANDO RODRIGUEZ

Art Unit

2828

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 6-13 and 15-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-13 and 15-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

Claims 1-4,6-13,15-20 are pending.

Claims 5 and 14 have been canceled.

The objection to the drawings has been withdrawn based on applicant's amendment filed on December 13, 2004 of claim 3, however the multilayer structure of claim 10 will be considered a conventional structure, see 37 CFR 1.83 (a).

The objection of claims 8 and 16 has been withdrawn based on applicant's amendment filed on December 13, 2004.

### ***Response to Arguments***

Applicant's arguments filed December 13, 2004 have been fully considered but they are not persuasive.

On page 11 of the Remarks applicant describes the drawing of figure 1 and discusses the elements that constitute the ridge, however claims 1 and 11 do not recite such limitations but only recite a ridge with surfaces; applicant is reminded that "reading limitations of the specification into a claim" is impermissible see MPEP 2111.

On page 11 of the Remarks applicant discloses amending claims 1 and 11 to clarify the differences between the present invention and the cited prior art Kunisato et al, which requires contact of the top surface of the ridge and the current blocking layer however the specification does not support such a limitation; furthermore the drawings

illustrate non-contact between the top surface of the ridge and the current blocking layer.

Claim 1 has been considered a product-by-process claim based on applicant's arguments of "a transverse growth technique". Applicant is reminded determination of patentability is based on the product itself and does not depend on its method of production, See MPEP 2113.

Regarding applicant's arguments pertaining to the transverse growth technique applicant discloses on page 12 of the Remarks of using MOVCD to form the layers and transverse growth technique to form an overhang over the ridge, however none of the claims recite the limitation of an overhang over the ridge, which is the structure formed by the recited transverse growth technique. Furthermore the cited prior art and the present application both use MOCVD to form the layers and since no structure is recited that requires the transverse growth technique such a technique will be considered a design preference.

### ***Claim Objections***

Claims 1 and 11 are objected to because of the following informalities: The recited limitations of "upper surface" and "top surface" are interpreted as having the same meaning i.e. upper surface. It is suggested for applicant to maintain consistency throughout the claim language and should amend "top surface" to read as "upper surface". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

Art Unit: 2828

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. On page 11 of the Remarks applicant discloses amending claims 1 and 11 to clarify the differences between the present invention and the cited prior art Kunisato et al, which requires contact of the top surface of the ridge and the current blocking layer however the specification does not support such a limitation; furthermore the drawings illustrate non-contact between the top surface of the ridge and the current blocking layer.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

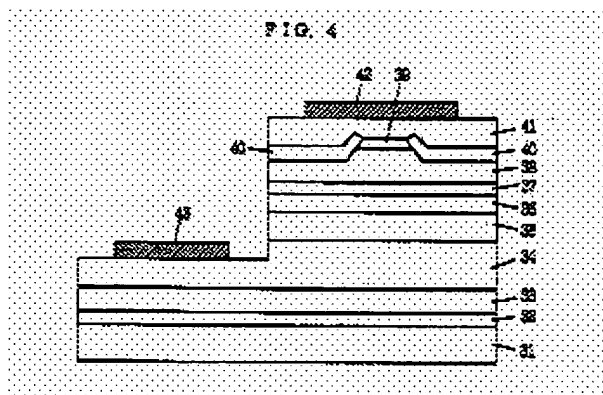
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4,9 are rejected under 35 U.S.C. 102(e) as being anticipated by Kunisato et al (PN 6,162,656).

Regarding claims 1,

Art Unit: 2828

Figure 4 illustrates a nitride semiconductor laser having a nitride based semiconductor layer (32) with the composition of AlGa<sub>N</sub>, a nitride semiconductor layer (38) with the composition of AlGa<sub>N</sub> and formed into a ridge and the ridge having a width, a current blocking layer (40) formed on the side of the ridge to the top surface of the ridge, where the current blocking layers form a space on the top surface of the ridge, which has a width smaller than the width of the top surface of the ridge and a nitride semiconductor layer (39) with the composition of Ga<sub>N</sub> is disposed in the space formed by the current blocking layers. See column 10 lines 15-37.



Regarding claim 2,

The current blocking layer of Kunisato et al illustrated in figure 4 has the composition of Ga<sub>N</sub> or AlGa<sub>N</sub>, as described in column 10 lines 30-31.

Regarding claims 3,

Figure 4 illustrates an n-type cladding layer (35), an active layer (36) and a p-type cladding layer (38) having a ridge. See column 10 lines 15-30 and lines 42-53.

Regarding claim 4,

The current blocking layer of Kunisato et al illustrated in figure 4 has the composition of Ga<sub>N</sub> or AlGa<sub>N</sub>, as described in column 10 lines 30-31.

Regarding claims 9,

Figure 4 illustrates the current blocking layer (40) having a single-layer structure.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) as applied to claims 1 above, and further in view of Sugiura et al (PN 5,932,896).

Regarding claim 6,

The current blocking layer of Kunisato et al illustrated in figure 4 has the composition of GaN or AlGa<sub>N</sub>, as described in column 10 lines 30-31.

Kunisato et al is silent as to the current blocking layer containing the composition of indium and gallium.

However, the use of current blocking layers having the composition of indium and gallium is well known in the art and is described by Sugiura et al in column 24 lines 7-9, as a desired composition, which implies a design preference.

Therefore, it would have been obvious to one of ordinary skill in the art to provide the nitride semiconductor laser of Kunisato et al with the current blocking layer of Sugiura et al because it would provide current blocking.

Claims 7,8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) as applied to claim 1 above, and further in view of Hatakoshi et al (PN 6,031,858).

Regarding claim 7,

Kunisato et al discloses a nitride semiconductor cap layer (39), where the cap layer is inside the opening formed on the top surface of the ridge and a nitride semiconductor contact layer (41), which is in contact with the cap layer, and where both layers have the composition of p-type GaN and provide an electrical contact between the electrode (42) and the ridge.

Kunisato et al does not describe a single layer, which is inside the opening and covers the region above the opening and a region on the current blocking layer.

Hatakoshi et al illustrates in figure 1 a nitride based semiconductor laser having a ridge (19), a current blocking layer (20) and a contact layer (21) with the composition of a p-type GaN, where the contact layer is a single layer formed within the region of an opening and on a region of the current blocking layer, as described in column 11 lines 15-33.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide Kunisato et al nitride based semiconductor laser with the



Art Unit: 2828

contact layer of Hatakoshi et al because it would provide an electrical contact between the electrode and the ridge for current injection.

Regarding claim 8,

Kunisato et al does illustrate in figure 4 an electrode (42), as described in column 10 lines 38-40.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656).

Regarding claims 10,

Figure 4 Kunisato et al illustrates the current blocking layer (40) having a single-layer structure with the composition of GaN or AlGaIn, as described in column 10 lines 30-31.

Kunisato et al is silent as to current blocking having multiple layers.

However, in accordance with *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), the court has held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP 2144.04 VI.

Claim 11,13,17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) in view of Burnham et al (PN 4,433,417).

Figure 4 illustrates a nitride semiconductor laser having a nitride based semiconductor layer (32) with the composition of AlGaIn, a nitride semiconductor layer (38) with the composition of AlGaIn and formed into a ridge and the ridge having a

Art Unit: 2828

width, a current blocking layer (40) formed on the side of the ridge to the top surface of the ridge, where the current blocking layers form a space on the top surface of the ridge, which has a width smaller than the width of the top surface of the ridge and a nitride semiconductor layer (39) with the composition of GaN is disposed in the space formed by the current blocking layers. See column 10 lines 15-37. Column 10 lines 42-44, discloses manufacturing the semiconductor laser by chemical vapor deposition such as MOVCD.

Kunisato et al does not explicitly disclose a transverse growth technique.

However, the use of the transverse growth technique is well known in the art as evident by Burnham et al in column 6 lines 7-10 describes transverse growth for nonplanar surfaces.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the teaching of Burnham et al with the semiconductor laser of Kunisato et al because it would provide growth of the current blocking layer on the angled surface of the ridge, column 6 lines 10-15.

Regarding claim 13,

Figure 4 illustrates an n-type cladding layer (35), an active layer (36) and a p-type cladding layer (38) having a ridge. See column 10 lines 15-30 and lines 42-53.

Regarding claim 17,

Figure 4 illustrates the current blocking layer (40) having a single-layer structure.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) in view of Burnham et al (PN 4,433,417) as applied to claim 11 above, and further in view of Sugiura et al (PN 5,932,896).

Regarding claim 12,

Kunisato et al discloses forming the current blocking layers (40) on the side of the ridge (38).

Kunisato et al is silent as to disposing an insulating film on the upper surface of the ridge for obtaining an opening.

Sugiura et al illustrates in figure 34C an insulating film (99) disposed on the upper surface of the ridge (85) to obtain an opening between layers (98), as described in column 26 lines 7-19.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the nitride semiconductor laser of Kunisato et al with the insulating film of Sugiura et al because it would prevent the growth of the current blocking layers on the top surface of the ridge.

Claims 15,16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) in view of Burnham et al (PN 4,433,417) as applied to claim 11 above, and further in view of Hatakoshi et al (PN 6,031,858).

Regarding claim 15,

Kunisato et al discloses a nitride semiconductor cap layer (39), where the cap layer is inside the opening formed on the top surface of the ridge and a nitride

Art Unit: 2828

semiconductor contact layer (41), which is in contact with the cap layer, and where both layers have the composition of p-type GaN and provide an electrical contact between the electrode (42) and the ridge.

Kunisato et al does not describe a single layer, which is inside the opening and covers the region above the opening and a region on the current blocking layer.

Hatakoshi et al illustrates in figure 1 a nitride based semiconductor laser having a ridge (19), a current blocking layer (20) and a contact layer (21) with the composition of a p-type GaN, where the contact layer is a single layer formed within the region of an opening and on a region of the current blocking layer, as described in column 11 lines 15-33.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide Kunisato et al nitride based semiconductor laser with the contact layer of Hatakoshi et al because it would provide an electrical contact between the electrode and the ridge for current injection.

Regarding claim 16,

Kunisato et al does illustrate in figure 4 an electrode (42), as described in column 10 lines 38-40.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) in view of Burnham et al (PN 4,433,417) as applied to claim 11 above.

Regarding claims 18,

Figure 4 Kunisato et al illustrates the current blocking layer (40) having a single-layer structure with the composition of GaN or AlGa<sub>N</sub>, as described in column 10 lines 30-31.

Kunisato et al is silent as to current blocking having multiple layers.

However, in accordance with *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), the court has held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced. See MPEP 2144.04 VI.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) as applied to claims 1 and 4 above.

Regarding claim 19,

Kunisato et al does illustrate current blocking layers form a space on the top surface of the ridge, which has a width smaller than the width of the top surface of the ridge, thereby the difference in width will provide a ratio of the width less than 1 and greater than zero.

Kunisato et al does not explicitly disclose a ratio of not less than 0.1 nor more than 0.95.

However, in accordance with MPEP 2144.05 Obviousness Ranges:

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kunisato et al (PN 6,162,656) in view of Burnham et al (PN 4,433,417) as applied to claims 11 and 12 above.

Regarding claims 18,

Figure 4 Kunisato et al illustrates the current blocking layer (40) having a single-layer structure with the composition of GaN or AlGaIn, as described in column 10 lines 30-31.

Kunisato et al does illustrate current blocking layers form a space on the top surface of the ridge, which has a width smaller than the width of the top surface of the ridge, thereby the difference in width will provide a ratio of the width less than 1 and greater than zero.

Kunisato et al does not explicitly disclose a ratio of not less than 0.1 nor more than 0.95.

However, in accordance with MPEP 2144.05 Obviousness Ranges:

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)

### ***Conclusion***

Art Unit: 2828

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ARMANDO RODRIGUEZ whose telephone number is 571-272-1952. The examiner can normally be reached on 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
ARMANDO RODRIGUEZ  
Examiner  
Art Unit 2828

AR